Monitoring Results
Annual and Quarterly Review
April 2012 – January 2013

MUN POTW

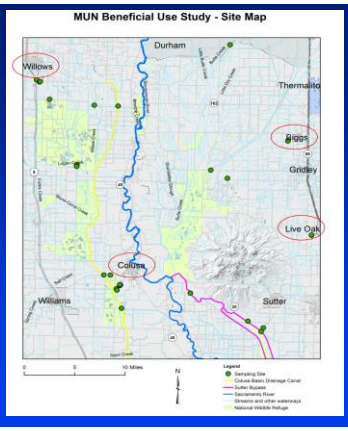
Sacramento Valley Archetype

Westside: Willows, Colusa
Eastside: Biggs, Live Oak

Calvin Yang

Outline

- First year of monitoring
  - Key observations of all data through Jan 2013
- Storm Season/3rd Quarter Observations
- Summary
- Proposed Monitoring for Apr – Sept 2013

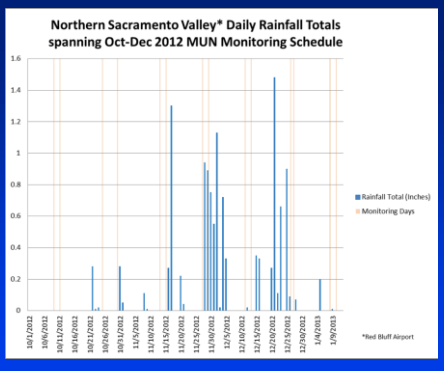


Monitoring Overview
April 2012 – January 2013

- Nitrate exceedanes in Colusa, Live Oak, and Willows' Effluent
  - Does not continue downstream
- Ammonia exceedances in Biggs' Effluent
  - Does not continue downstream
- Sodium exceedances in almost all samples
- Total Al, Fe, Mn only upstream and downstream of POTW effluent

Monitoring Overview
April 2012 – January 2013

- Majority of arsenic surrounding Live Oak and in effluent
- Trihalomethanes only in Willows effluent, but not downstream
- Boron exceedances upstream of Colusa
- Still reviewing E. coli results



Storm Season Observations
October thru January 2012

- Water levels generally increased during December 2012 sampling event
- Most exceedance consistent with previous results except as follows:
  - No Total As and Nitrate exceedances in Lateral #2 during Dec 2012
  - No Nitrate exceedances in Unnamed Tributary during Nov – Dec 2012
  - New Total Fluoride and Sulfate exceedances in Colusa sample sites except Colusa's Effluent

Unnamed Tributary Downstream of Colusa Effluent

Oct 09

Dec 26

Jan 29

C Main Drain Downstream of Biggs Effluent

Oct 30

Dec 27

Jan 30

Logan Creek Downstream of Willows Effluent

Oct 25

Dec 26

Jan 29

October 2012 thru January 2013 Monthly Samples

Parameter	Frequency	Number of Samples with Exceedances (Total Samples)	Criteria
Arsenic - Total	1/month	9 (52)	10 µg/L
Arsenic - Dissolved	1/month	8 (39)	10 µg/L
Nitrate as N	1/month	19 (118)	10 mg/L
Boron	1/month	1 (118)	1 mg/L
Sodium	1/month	83 (118)	20 mg/L
Hardness	1/month	(118)	N/A
Sulfate	1/month	4 (88)	250 mg/L
Ammonia as N	1/month	7 (21)	1.5 mg/L
Total Dissolved Solids	1/month	25 (88)	500 mg/L
Conductance	2/month	17 (231)	900 µS/cm
Turbidity	2/month	(231)	
pH	2/month	2 (230)	6.5 - 8.5
photos	2/month	(748)	
DO	2/month	(231)	
Temperature	2/month	(231)	

October 2012 thru January 2013 Quarterly Samples

Parameter	Number of Samples with Exceedances (Total Samples)	Criteria
Antimony - Total	0 (30)	6 µg/L
Barium - Total	0 (30)	1 mg/L
Beryllium - Total	0 (30)	4 µg/L
Cadmium - Total	0 (30)	5 µg/L
Chromium - Total	0 (30)	50 µg/L
Copper - Total	0 (30)	1 mg/L
Lead - Total	0 (30)	15 µg/L
Mercury - Total	0 (30)	2 µg/L
Nickel - Total	0 (30)	100 µg/L
Selenium - Total	0 (30)	50 µg/L
Silver - Total	0 (30)	100 µg/L
Thallium - Total	0 (30)	2 µg/L
Zinc - Total	0 (30)	5 mg/L
Perchlorate	0 (30)	6 µg/L
Chloride	0 (88)	250 mg/L
Fluoride	1 (30)	2.0 mg/L
Aluminum - Total	23 (30)	200 µg/L
Aluminum - Dissolved	0 (30)	200 µg/L
Iron - Total	24 (30)	300 µg/L
Iron - Dissolved	1 (30)	300 µg/L
Manganese - Total	22 (30)	50 µg/L
Manganese - Dissolved	4 (30)	50 µg/L
Bromoform	0 (4)	4.3 µg/L
Chloroform	1 (4)	5.7 µg/L
Bromodichloromethane	1 (4)	0.56 µg/L
Dibromochloromethane	1 (4)	0.41 µg/L

Colusa Exceedances (October 2012 – January 2013)

Site	Number of Samples with Exceedances (Total Samples)										
	Aluminum - Total	Iron - Total	Manganese Total	Manganese - Dissolved	Nitrate as N	Sodium	TDS	Conductivity	Boron	Fluoride - Total	Sulfate
Criteria:	200 µg/L	300 µg/L	50 µg/L	50 µg/L	10 mg/L	20 mg/L	500 mg/L	900 µS/cm	1 mg/L	2 mg/L	250 mg/L
Colusa Basin Drain at Highway 20	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	0 (4)	**4 (4)**	0 (3)	0 (8)	0 (4)	0 (1)	0 (3)
Powell Slough at Highway 20	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	0 (4)	**4 (4)**	**1 (3)**	**2 (8)**	0 (4)	0 (1)	0 (3)
New Ditch	**1 (1)**	**1 (1)**	**1 (1)**	**1 (1)**	0 (3)	**3 (3)**	**2 (2)**	**5 (6)**	**1 (3)**	0 (1)	**1 (2)**
Unnamed Tributary, Upstream of Discharge	**1 (1)**	**1 (1)**	**1 (1)**	**1 (1)**	0 (3)	**3 (3)**	**2 (2)**	**2 (6)**	0 (3)	0 (1)	**1 (2)**
Effluent	0 (1)	0 (1)	0 (1)	0 (1)	**4 (4)**	**4 (4)**	**3 (3)**	**4 (8)**	0 (4)	0 (1)	0 (3)
Unnamed Tributary, Downstream of Discharge	**1 (1)**	**1 (1)**	**1 (1)**	**1 (1)**	**2 (4)**	**4 (4)**	**3 (3)**	**2 (8)**	0 (4)	0 (1)	0 (3)
Powell Slough, Upstream of Unnamed Tributary	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	0 (4)	**4 (4)**	**1 (3)**	**1 (8)**	0 (4)	0 (1)	**1 (3)**
Powell Slough, Downstream of Unnamed Tributary	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	0 (4)	**4 (4)**	**1 (3)**	**1 (8)**	0 (4)	**1 (1)**	**1 (3)**
Colusa Basin Drain at Abel Road	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	0 (4)	**4 (4)**	0 (3)	0 (8)	0 (4)	0 (1)	0 (3)

Willows Exceedances (October 2012 – January 2013)

Site	Number of Samples with Exceedances (Total Samples)									
	Aluminum - Total	Iron - Total	Iron - Dissolved	Manganese - Total	Nitrate as N	Sodium	TDS	Chloroform	Bromodichloro methane	Dibromochloro methane
Criteria:	200 µg/L	300 µg/L	300 µg/L	50 µg/L	10 mg/L	20 mg/L	500 mg/L	5.7 µg/L	0.56 µg/L	0.41 µg/L
Ag Drain C, Upstream of Discharge	**1 (1)**	**1 (1)**	0 (1)	0 (1)	0 (4)	**4 (4)**	0 (3)	NA	NA	NA
Effluent	0 (1)	0 (1)	0 (1)	0 (1)	**4 (4)**	**4 (4)**	**3 (3)**	**1 (1)**	**1 (1)**	**1 (1)**
Ag Drain C, Downstream of Discharge	**1 (1)**	**1 (1)**	0 (1)	0 (1)	0 (4)	**4 (4)**	0 (3)	0 (1)	0 (1)	0 (1)
Ag Drain C at Road 60	**1 (1)**	**1 (1)**	0 (1)	**1 (1)**	0 (4)	**4 (4)**	0 (3)	NA	NA	NA
Willow Creek at Road 61	**1 (1)**	**1 (1)**	0 (1)	**1 (1)**	0 (4)	**2 (4)**	0 (3)	NA	NA	NA
Colusa Basin Drain at Road 61	**1 (1)**	**1 (1)**	0 (1)	**1 (1)**	0 (4)	**3 (4)**	0 (3)	NA	NA	NA
Logan Creek, Downstream of Effluent	**1 (1)**	**1 (1)**	0 (1)	**1 (1)**	0 (4)	**4 (4)**	0 (3)	NA	NA	NA
Hunters Creek, Downstream of Effluent	**1 (1)**	**1 (1)**	**1 (1)**	**1 (1)**	0 (4)	**3 (4)**	0 (3)	NA	NA	NA

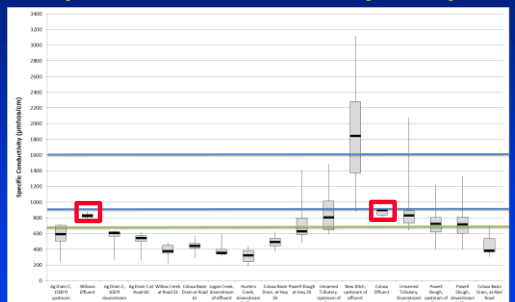
Live Oak Exceedances (October 2012 – January 2013)

Site	Number of Samples with Exceedances (Total Samples)							
	Aluminum - Total	Arsenic - Total	Arsenic - Dissolved	Iron - Total	Manganese - Total	Nitrate as N	Sodium	TDS
Criteria:	200 µg/L	10 µg/L	10 µg/L	300 µg/L	50 µg/L	10 mg/L	20 mg/L	500 mg/L
Lateral #2, Upstream of Discharge	0 (1)	**2 (4)**	**2 (3)**	0 (1)	**1 (1)**	**2 (4)**	**4 (4)**	**3 (3)**
Effluent	0 (1)	**4 (4)**	**3 (3)**	0 (1)	0 (1)	**4 (4)**	**4 (4)**	**3 (3)**
Lateral #2, Downstream of Discharge	0 (1)	**3 (4)**	**3 (3)**	0 (1)	0 (1)	**3 (4)**	**4 (4)**	**3 (3)**
Wadworth Canal, Downstream of Effluent	**1 (1)**	0 (4)	0 (3)	**1 (1)**	**1 (1)**	0 (4)	0 (4)	0 (3)
Sutter Bypass, Upstream of Effluent	**1 (1)**	0 (4)	0 (3)	**1 (1)**	**1 (1)**	0 (4)	0 (4)	0 (3)
Sutter Bypass, Downstream of Effluent	**1 (1)**	0 (4)	0 (3)	**1 (1)**	**1 (1)**	0 (4)	0 (4)	0 (3)

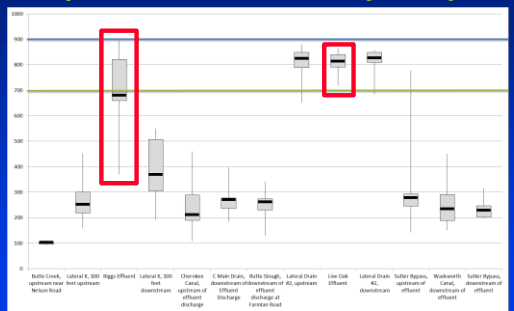
Biggs Exceedances (October 2012 – January 2013)

Site	Number of Samples with Exceedances (Total Samples)					
	Aluminum - Total	Iron - Total	Manganese - Total	Manganese - Dissolved	Sodium	Ammonia as N
Criteria:	200 µg/L	300 µg/L	50 µg/L	50 mg/L	20 mg/L	1.5 mg/L
Butte Creek near Nelson Road	0 (1)	0 (1)	0 (1)	0 (1)	0 (4)	0 (3)
Lateral K, Upstream of Discharge	**1 (1)**	**1 (1)**	**1 (1)**	**1 (1)**	**1 (4)**	0 (3)
Effluent	0 (1)	**1 (1)**	0 (1)	0 (1)	**4 (4)**	**3 (3)**
Lateral K, Downstream of Discharge	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	**2 (4)**	**3 (3)**
Cherokee Canal, Upstream of Effluent	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	**1 (4)**	**1 (3)**
C Main Drain, Downstream of Effluent	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	0 (4)	0 (3)
Butte Slough at Farmlan Road	**1 (1)**	**1 (1)**	**1 (1)**	0 (1)	0 (4)	0 (3)

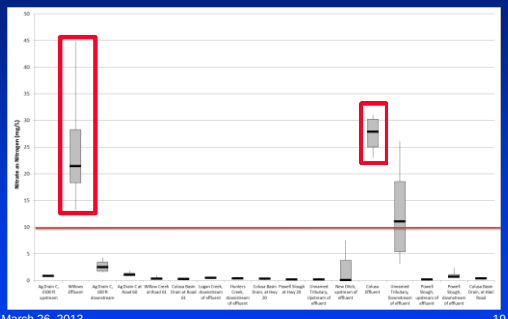
West Side – Specific Conductance (October 2012 – January 2013)



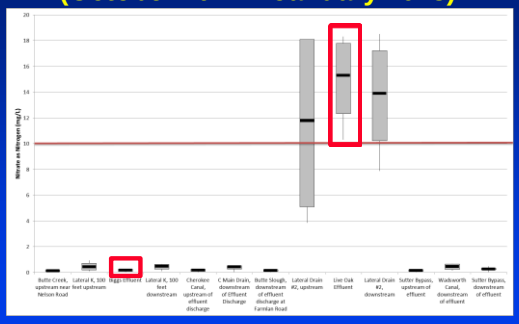
East Side – Specific Conductance (October 2012 – January 2013)



West Side – Nitrate as Nitrogen (October 2012 – January 2013)



East Side – Nitrate as Nitrogen (October 2012 – January 2013)



Summary of Exceedances (October 2012 – January 2013)

	Colusa			Willows			Live Oak			Biggs		
Parameter	Upstream	Effluent	Downstream	Upstream	Effluent	Downstream	Upstream	Effluent	Downstream	Upstream	Effluent	Downstream
Aluminum - Total	X		X	X		X			X	X		X
Arsenic - Total							X	X	X			
Arsenic - Dissolved							X	X	X			
Iron - Total	X		X	X		X			X	X	X	X
Iron - Dissolved						X						
Manganese - Total	X		X			X	X		X	X		X
Manganese - Dissolved	X		X							X		
Nitrate as Nitrogen		X	X		X		X	X	X			
Sodium	X	X	X	X	X	X	X	X	X	X	X	X
TDS	X	X	X		X		X	X	X			
Conductivity	X	X	X									
Boron	X											
Fluoride - Total			X									
Sulfate	X		X									
Ammonia as Nitrogen											X	X
Chloroform					X							
Bromodichloromethane					X							
Dibromochloromethane					X							

Summary of All Exceedances (April 2012 – January 2013)

	Colusa			Willows			Live Oak			Biggs		
Parameter	Upstream	Effluent	Downstream	Upstream	Effluent	Downstream	Upstream	Effluent	Downstream	Upstream	Effluent	Downstream
Aluminum - Total	X		X	X		X	V		X	X		X
Arsenic - Total	W		W				X	X	X			
Arsenic - Dissolved							A	A	A			
Iron - Total	X		X	X		X	V		X	X	B	X
Iron - Dissolved						Y						
Manganese - Total	X		X	V		X	X		X	X		X
Manganese - Dissolved	A		Y			W				A		W
Nitrate as Nitrogen		X	X		X		X	X	X			
Sodium	X	X	X	X	X	X	X	X	X	B	X	X
TDS	A	X	A		X		A	X	A		Z	
Conductivity	X	B	X				Z	Z	Z		W	
Boron	B											
Fluoride - Total			Y									
Sulfate	Y		Y									
Ammonia as Nitrogen											X	A
Chloroform					X							
Bromodichloromethane					X							
Dibromochloromethane					X							

Z	= Exceedance observed in April 2012 - June 2012 Samples Only (Quarter 1)
V	= Exceedance observed in April 2012 - September 2012 Samples Only (Quarter 1 & 2)
W	= Exceedance observed in July 2012 - September 2012 Samples Only (Quarter 2)
A	= Exceedance observed in July 2012 - January 2013 Samples Only (Quarter 2 and 3)
Y	= Exceedance observed in October 2012 - January 2013 Samples Only (Quarter 3)
B	= Exceedance observed in April 2012 - June 2012; October 2012 - January 2013 Samples Only (Quarter 1 & 3)
X	= Exceedance observed in April 2012 - January 2013 Samples (Quarter 1, 2, 3)

Proposed Monitoring for Apr '13 – Sept '13

- Continue field sampling twice per month (variability in conductivity)
- Continue existing constituents with following adjustments:
  - Stop sampling Nitrate at Biggs sample sites.
  - Stop sampling Boron at Biggs, Live Oak, Willows sample sites.
  - Change Total Fluoride sampling to monthly for Colusa sample sites only.
  - Resume Total and Dissolved Arsenic sampling for all sites.

Estimated BSK Lab Budget

Total Funds in BSK Lab Contract:	$45,100
Spent So Far (Dec 2012 - Mar 2013):	$18,880
Remaining Funds for Apr '13 - Sept '13 Samples:	$26,220
Cost for Apr - Sept '13 with No Changes:	$24,388
Cost for Apr - Sept '13 with Changes:	$25,096